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10/809,804	03/26/2004	Hiroshi Kanno	50024-030	7163

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EXAMINER	
YAMNITZKY, MARIE ROSE	

ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/809,804	KANNO ET AL.	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 November 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,7,9-14,16 and 18-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,7,9-14,16 and 18-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's amendment filed on September 25, 2007, which amends claims 1, 4, 9-13, 16, 18 and 22-27, and cancels claims 2, 3, 8 and 15, has been entered.

Claims 1, 4, 7, 9-14, 16 and 18-27 are pending.

2. The rejection of claims 25-27 under 35 U.S.C. 112, 2nd paragraph, as set forth in the Office action mailed May 25, 2007 is overcome by claim amendment.

The rejection of claims 1-4, 12, 15, 16, 18 and 21-27 under 35 U.S.C. 102(b) as anticipated by Mishima (US 2001/0053462 A1) is partly rendered moot by claim cancellation and partly overcome by claim amendment. The Mishima reference remains applicable under 35 U.S.C. 102(b) against some of the present claims for reasons set forth later in this Office action, and remains applicable under 35 U.S.C. 103(a).

3. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Proper antecedent basis is lacking for "said assisting dopant" as recited in the last line of claim 24. Claim 24 depends from claim 1, which requires a first assisting dopant in the long

wavelength light emitting layer, and claim 24 further requires an assisting dopant in the short wavelength light emitting layer.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 16, 18, 21-23 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Mishima (US 2001/0053462 A1).

See the entire publication. In particular, see Example 4, Table 1 and the claims.

The device of Example 4 contains three separate light emitting layers.

One of the light emitting layers of the Example 4 device is a green light-emitting layer comprising 4,4'-N,N'-dicarbazolebiphenyl as a host material and tris(2-phenylpyridine) iridium as a green light-emitting material. Tris(2-phenylpyridine) iridium is an iridium complex that is a phosphorescent material having a molecular structure expressed by present formula (B1) as defined in present claim 16, and further expressed by the formula set forth in present claim 27, that provides a peak emission wavelength of 515 nm. The peak emission wavelength of the green light-emitting layer of the Example 4 device is within the scope of the peak wavelength range set forth in the present claims for the short wavelength light emitting layer.

One of the light emitting layers of the Example 4 device is a red light-emitting layer comprising 4,4'-N,N'-dicarbazolebiphenyl as a host material and bis(2-phenylquinoline)-acetylacetonate iridium as a red light-emitting material. Bis(2-phenylquinoline)acetylacetonate iridium is an iridium complex that is a phosphorescent material that provides a peak emission wavelength of 600 nm. The peak emission wavelength for the red light-emitting layer of the Example 4 device is within the scope of the peak wavelength range set forth in the present claims for the long wavelength light emitting layer.

The short wavelength (green) light-emitting layer and the long wavelength (red) light-emitting layer are formed in this order between anode and cathode in the device of Example 4.

The device of Example 4 meets the limitations of present claims 16, 18, 21-23 and 27 wherein the assisting dopant of the short wavelength light emitting layer is not explicitly required to be different from the host material in the short wavelength light emitting layer. The host material in the green light-emitting layer and in the red light-emitting layer of the Example 4 device has hole transport capability and is an amine-based material.

With respect to the ratio of maximum peak luminous intensity as recited in present claim 22, Mishima does not disclose the ratio for the three peak wavelengths emitted by the exemplary devices. It is the examiner's position that it is reasonable to expect that Mishima's Example 4 device meets the limitations of claim 22 since Mishima's devices emit white light.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 4, 7, 9-14, 16 and 18-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mishima (US 2001/0053462 A1) as applied to claims 16, 18, 21-23 and 27 above, and for the further reasons set forth below.

Present independent claims 1 and 13, and claims dependent therefrom, require the device to have the layered structure of anode, long wavelength light emitting layer, short wavelength light emitting layer, cathode. As noted above, Mishima's Example 4 device has the layered structure of anode, short wavelength light emitting layer, long wavelength light emitting layer, cathode.

Present independent claim 1 and dependents require that the long wavelength light emitting layer contain a first assisting dopant having a hole transporting capability. Claim 24 depends from claim 1 and further requires that the short wavelength light emitting contain an assisting dopant.

Present independent claim 13, with claim 14 dependent therefrom, requires that the short wavelength light emitting layer contain an assisting dopant that is composed of the same material as the host material of the long wavelength light emitting layer.

With the exception of the order of the short wavelength light emitting layer and the long wavelength light emitting layer between the anode and cathode, the device of Mishima's Example 4 meets the limitations of present claims 1, 4, 11-14 and 24-26 wherein the assisting dopant of the long wavelength light emitting layer (in the case of claims 1, 4, 11, 12 and 24-26) is not explicitly required to be different from the host material in the long wavelength light emitting layer, and wherein the assisting dopant of the short wavelength light emitting layer (in the case of claims 13, 14 and 24) is not explicitly required to be different from the host material in the short wavelength light emitting layer. The host material in the green light-emitting layer and in the red light-emitting layer of the Example 4 device has hole transport capability and is an amine-based material. Regarding the order of the light emitting layers, it would have been an obvious modification to one of ordinary skill in the art at the time of the invention to reverse the order of the light emitting layers without changing the function of the device.

With respect to the molecular structure of the phosphorescent material in the long wavelength light emitting material as required by present claims 4, 25 and 26, the iridium complex used in the red emitting layer of Mishima's Example 4 device has the required molecular structure.

Present claim 7 depends from claim 4 and further limits the phosphorescent material to one having a tris(2-phenylquinoline)iridium skeleton. Mishima does not explicitly disclose an iridium complex of the structure required by claim 7, but teaches that 2-phenylquinoline derivatives may be used. For example, see paragraph [0015]. The 2-phenylquinoline derivative used in Mishima's Example 4 device is an iridium complex having two 2-phenylquinoline

ligands and an acetylacetonate ligand, whereas claim 7 requires an iridium complex having three 2-phenylquinoline ligands. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to utilize iridium complexes of 2-phenylquinoline other than the complex used in Mishima's Example 4. One of ordinary skill in the art at the time of the invention would have reasonably expected that a tris(2-phenylquinoline) iridium complex could be used for the same purpose as the bis complex utilized in Example 4 since Mishima's teachings in paragraph [0015] imply that any iridium complex of substituted or unsubstituted 2-phenylquinoline may be used.

With respect to the ratio of maximum peak luminous intensity as recited in present claim 12, Mishima does not disclose the ratio for the three peak wavelengths emitted by the exemplary devices. It is the examiner's position that it is reasonable to expect that Mishima's Example 4 device meets the limitations recited in claim 12 since Mishima's devices emit white light, and that reversing the order of the light emitting layers between the anode and cathode would not significantly affect the ratio of the peak emission wavelengths.

With respect to present claims 9, 10, 19 and 20, these claims do not read on a device in which the assisting dopant of a particular layer is the same as the host material of that layer. Based on the limitations of present claims 9 and 10, the assisting dopant in the long wavelength light emitting layer cannot be the same as the host material in the long wavelength light emitting layer. Similarly, based on the limitations of present claims 19 and 20, the assisting dopant in the short wavelength light emitting layer cannot be the same as the host material in the short wavelength light emitting layer. Further, for all of the present claims, presuming for the sake of

argument that the first host material and the second host material is not the same material, and that the assisting dopant for a particular layer is not the same as the host material of that layer, Mishima does not provide any examples having different host materials and meeting the claim limitations regarding the assisting dopant(s).

However, Mishima teaches that the light emitting layers may comprise mixtures of host materials. Possible host materials as disclosed in paragraph [0036] include many materials known to have hole transport capability. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to select a suitable combination of materials for use in the light emitting layers from materials known in the art and suggested by Mishima.

With respect to the volume ratio recited in present claims 9 and 19, it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum relative amounts of different components in the light emitting layers in order to provide a functional device and to optimize device performance.

With respect to the relative HOMO energy levels recited in present claims 10 and 20, it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to select combinations of materials having appropriate relative HOMO energy levels so as to affect the movement of holes to the phosphorescent material, the movement of holes to the phosphorescent material being a necessary requirement in order to achieve light emission from the phosphorescent material.

Even if the present claims are required to comprise a combination of more materials than utilized in Mishima's Example 4 device, and it is the examiner's position that only present claims 9, 10, 19 and 20 clearly require at least one material in addition to those of Mishima's Example 4 device, it would have been within the level of ordinary skill of a worker in the art to determine suitable and optimum combinations of materials to be used to provide a white light-emitting device with improved light-emitting efficiency and light-emitting luminance, which are characteristics intended to be provided by Mishima (e.g. see paragraphs [0006]-[0007]).

8. Applicant's arguments filed September 25, 2007 have been fully considered but they are not persuasive.

Applicant argues that there are significant differences between the claimed subject matter and the device disclosed by Mishima. Applicant argues that independent claim 1 provides the effect taught at page 6, line 15 to p. 7, l. 6 of the specification; that independent claim 13 provides the effect taught at p. 9, l. 2-8 of the specification; that independent claim 18 provides the effect taught at p. 11, l. 4-16 of the specification; and that independent claim 23 provides the effect taught at p. 13, l. 11-17 of the specification. It is not clear how the argued effects reflect significant differences between the claimed subject matter and Mishima's device. As taught in paragraph [0007], Mishima intends to provide a white light-emitting device having excellent light-emitting efficiency and light-emitting luminance.

9. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
January 20, 2008

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER

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